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ABSTRACT

A year-long cooperative study examined school readiness and academic achievement of normal and at-risk students. Subjects were 360 Russian and 400 American first-graders. A Russian-developed diagnostic screening instrument was used to identify at-risk individuals. Data were then collected through achievement tests at the beginning and end of the school year, teacher ratings of students, and surveys of schools, teachers, and families, following standard Russian research procedures. Results indicated that: (1) at-risk students scored less well on achievement tests as a whole than the control group; (2) American students had higher overall scores than the Russians; (3) Russian control students overtook their American counterparts on academic achievement tests by the end of the school year; (4) there was a wider variation in achievement scores between the Russian at-risk and control groups than the American at-risk and control group; and (5) boys were more likely than girls to be diagnosed as at-risk, although this gender difference was less pronounced among the Russian students than the Americans. Issues related to the cooperative nature of the study and Russian research techniques and instruments are also discussed. (MDM)

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Readiness and achievement of normal and at-risk Russian and American first graders.

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A paper presented at the 43rd annual meeting of the National Reading Conference
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Although recent articles have described research and instructional practices across a wide range of nations and cultures including Morocco (Spratt, Seckinger & Wagner, 1991), Germany (Beiglmaier, 1991), China (Hudson-Ross & Dong, 1990) and Nigeria (Etim, 1990), our understanding of research and practice in Russian literacy education remains very limited. The most recent journal article (Downing, 1984) in a literacy-oriented publication is now nearly 10 years old and the most recent monograph (Downing, 1988) on literacy and language research in republics of the former USSR includes only 4 chapters especially written for the volume and 19 translations of Soviet works that are, on average, 33 years old with original publication dates ranging from 1932 to 1976.

Although the primary objective of the presentation is to report on a descriptive study of Russian and American normal and at-risk first graders, the opportunity to conduct a cooperative investigation with Russian educators provided a unique opportunity to learn more about the central themes and practices of Russian literacy education. This was especially true given the decision to adapt Russian assessment instruments for use with American students. A secondary objective of the presentation will, therefore, be to describe some of the issues specifically related to the cooperative nature of the project that became apparent during the investigation. The presentation will conclude with some general guidelines intended to assist literacy educators interested in collaborative research, development, and implementation projects with Russian colleagues.

The portion of the presentation describing the comparative study reports on a year-long investigation of the readiness and achievement of normal and at-risk Russian and American first graders. A total of 760 (360 Russian and 400 American) first grade students participated in the study which was carried out during the 1991-1992 academic year. Approximately half of the students in both national groups were identified as students at-risk of failure on the basis of a Russian diagnostic screening instrument, although none at that time were identified as special education students. In addition to the screening instrument, which was administered at the beginning of the study (September, 1991), a Russian achievement test typically administered to assess learning at the end of first grade was used as a pre- and posttest measure. Teacher ratings were collected for each student on psychosocial development, physical health, and intellectual ability. In addition, data describing the schools, teachers, and families of the students participating in the study were collected.

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Selection of subjects began with the administration of a diagnostic screening measure to children in at least three first grade classes at each school site participating in the study (approximately 80 students). Students scoring in approximately the lowest, middle, and highest 15% at each site were eliminated from the study in order to identify two distinct groups of 20 subjects each at each site. The purpose of this procedure was to avoid students with extreme scores while still sorting students out into slightly above and below average groups. Students in the lower group were designated

"at-risk". Those in the above average group were identified as "normal" control subjects.

When students had been sorted into at-risk and control groups an achievement pretest was administered to all. All pretesting (diagnostic screen and achievement pretest) occurred in September of 1991. All students were tested again in June of 1992. All of the instruments used were English-language translations of Russian tests. No major adaptations were found to be necessary for use with American students. All students were trained to assure understanding of the tasks required on the tests.

Data were collected at 20 different sites, 10 schools in and around Moscow and 10 schools at scattered locations in the US. No attempt was made to match students or schools on socioeconomic, racial, or other demographic variables although subsequent data analyses of demographic data collected in the study were carried out to identify similarities and differences between students, teachers, and schools. One anticipated difference between the Russian and American children was chronological age. Since Russian children usually start formal academic training at seven years of age it was expected that the American children would be younger than their Russian counterparts. Approximately equal numbers of male and female students participated in the study.

All data collection was carried out by local personnel. Since the procedures employed were based on routine Russian educational practices no special training was provided to the Russian educators who collected data. Coordinators of data collection at all American sites, however, were provided training in the administration of all instruments.

The diagnostic screening instrument consisted of 2 main parts. One part (labelled DITA on the tables) asked teachers to report on 6 aspects of learning readiness:

1) overall health,
2) attitude toward the teacher,
3) attitude toward peers,
4) motivation,
5) experiential background, and
6) language development.

Part 2 of the diagnostic screen (DIDT) required students to carry out 6 tasks involving copying of a visual two-color pattern, drawing from oral directions, visual matching and visual problem solving tasks, and two tasks having to do with phonemic segmentation (from both visual and aural prompts).

The achievement measure consisted of 15 tasks which, for the purpose of analysis, have been broken out into 4 academic areas that include Mathematics, Language, Reading, and Writing. A listing of the kinds of items on each portion of the measure are provided in Appendix A. The mathematics portion assessed student competence both in mathematical concepts and applications. Language tasks assessed aspects of reading, writing, reading, and verbal expression. Since some of the language items were designed to be individually administered these items were administered either by a teacher, teacher's aide, or by an older student. All items on both the diagnostic screen and the achievement measure were rated on a scale of 1 to 4 with a rating of 1 indicating the highest possible level of performance and a 4 the lowest.

Initial data analysis explored similarities and differences between schools and teachers in the US and Russia. Four research questions guided the comparisons between the students.

1) Do Russian assessment techniques effectively identify Russian and American children who are at-risk for failure?
2) Are there differences in the level of preparedness for formal schooling between Russian and American first graders?
3) Are there differences in the achievement of Russian and American first graders after the first year of formal schooling?
4) Are there gender differences between normal and at-risk Russian and American first graders identified using Russian assessment techniques?

Data analysis

Analysis of data was carried out in SPSS (Windows). In instances where the data collected represented a true interval scale a 1-sample Kolmogorov-Smirnov (KS) test of normality (goodness of fit) was carried out to determine whether parametric tests were appropriate. If results of the KS analysis suggested the data collected were normally distributed t-tests were employed. If the KS analysis failed to support an assumption of normality non-paramertic tests were employed (primarily chi-square analyses based on categorical data.)

Results of Demographic Data Analayses

Results of an analysis comparing the population of the cities where the participating schools were located revealed that although all of the American schools were located in cities with populations < 225,000 only 5 of the Russian schools came from cities of this size with 5 (of the 10 total) coming from population centers exceeding 225,000 (Chi^2 T = 6.66667, p = .00982).

Other analyses of demographic data (See Table 1) revealed that although total enrollment at schools, class size, and teacher years of experience did not differ significantly in comparisons between Russian and American sites, American teachers tended to be older than their Russian counterparts and tended to have spent more years teaching in the schools participating in the study.

Table 1.

Total Enrollment

	n	Enrollment (sd)	t-value	DF	p
American	10	977 (770.262)	-0.88	18	.392
Russian	10	1228 (473.238)			

Class size

	n	Mean Class Size (sd)	t-value	DF	p
American	43	23.7907 (3.385)	-1.54	72	.128
Russian	31	25.3871 (5.506)			

Teacher age

	n	Mean Teacher Age (sd)	t-value	DF	p
American	43	43.7442 (9.379)	3.39	72	.001
Russian	31	35.3871 (11.789)			

Teacher years experience

	n	Mean Years Exp. (sd)	t-value	DF	p
American	43	18.1628 (8.837)	1.55	72	.125
Russian	31	14.5484 (11.177)			

Table 1. (cont.)

Teacher years in school

	≤ 9	> 9	
American	16	27	43 58.1
Russian	21	10	31 41.9
	37 50.0	37 50.0	

T	DF	p	Φ/∓
6.71718	1	.00955	-0.30129

Ratio of Teachers to Administrators

	n	Mean Ratio (sd)	t-value	DF	p
American	10	23.3455 (10.389)	1.92	17	0.072
Russian	9	15.8741 (5.558)			

Comparisons between the Russian and American children also revealed that Russian students had higher numbers of absences and American students tended to have more siblings than the Russian children. Results of these analyses are presented in Table 2.

Table 2.

Number of Siblings

	≤ 1	> 1	Row Total
American	117	284	401 52.5
Russian	299	64	363 47.5
Column Total	416 54.5	348 45.5	764 100.0

T	DF	p	Φ/∓
217.35312	1	.00000	-.53338

Absences

	≤ 4	> 4	Row Total
American	188	142	330 48.2
Russian	161	194	355 51.8
Column Total	349 50.9	336 49.1	685 100.0

T	DF	p	Φ/∓
9.23634	1	.00237	0.11612

Research Question 1

Question 1 focused on the effectiveness of the diagnostic screen in predicting achievement outcomes at the end of grade 1. Three approaches to addressing this issue were employed.

1) Do at-risk and control groups differ on posttest scores? (Informal inspection of mean scores for at-risk and control groups).

Results of the informal analysis of means (See Table 3A) revealed that the at-risk group of students consistently scored less well on the achievement tests as a whole and on each subtest than did the control group.

2) How good a predictor of achievement is the diagnostic measure? (Spearman r)

A correlation analysis of the diagnostic screen and the posttest score revealed correlations of .2757 and .4906 for the American and Russian groups respectively. Both of these correlations are significant at $P < 0.000$ (See Table 3B).

3) How effectively does the diagnostic measure sort outcomes? (hit/miss analysis)

A Hit/Miss analysis was carried out to determine the efficacy of the diagnostic screen in diagnosing both normal and at-risk students. Since there was reason to believe that there were differences between the performance of Russian and American students all posttest scores were converted to z-scores (standardized scores with a mean of 0 and a standard deviation of 1) within national groups. Data were subjected to a 2 X 2 Chi^2 test of independence with student groups (at-risk & control) on one axis and z-score categories on the other ($z \leq 0$, $z > 0$). Results of the analysis (See Table 3C) suggested that although posttest scores did seem to be significantly related to student groups for both Russian and American students, the Russian students showed a greater degree of association than did their American counterparts.

Table 3A.

Means (national groups collapsed):

	Lang	Math	Read	Write	Total
At-risk group	1.74	1.43	1.57	1.67	1.57
Control group	1.44	1.23	1.33	1.31	1.33

Table 3B.

	American	Russian
Correlation (Spearman) of Diagnostic and Posttest measures	.2757	.4906
p Value	< 0.00	< 0.00

Table 3C.

Results of Hit/Miss analyses.

Chi-square analyses according to standardized posttest scores.

American students

	$z \leq 0$	$z > 0$	Row Total
at-risk	110	82	192
			48.9
control	78	123	201
			51.1
Column Total	188	195	393
	47.8	52.2	100.0

T	DF	p	ϕ/Φ
13.44775	1	.00025	0.18498

Russian students

	$z \leq 0$	$z > 0$	Row Total
at-risk	94	66	160
			45.2
control	41	153	194
			54.8
Column Total	135	219	354
	38.1	61.9	100.0

T	DF	p	ϕ/Φ
52.58863	1	.00000	0.38543

Research Question 2

Question 2 focused on differences between the preparedness of first graders at the beginning of the school year and their achievement at the end of the year across the national groups utilizing informal inspection of mean scores. Results of data analysis exploring Question 2 are presented in Table 4.

Results of analysis of the diagnostic screen indicated consistently higher scores for the American students overall and within the 2 diagnostic screen subscores. In addition, it is interesting to note that there are consistently larger differences between the Russian at-risk and normal groups than between the American groups. Results of the analysis of the achievement pretest measure were very similar to those for the diagnostic screen. American students consistently outscored their Russian counterparts overall and on each achievement subscale. As before, an interaction between groups and nation seems apparent indicating wider differences between the at-risk and the control groups among the Russian students. Results of the posttest

analysis indicated that although American students retained higher overall posttest scores, the Russian control students overtook their American counterparts on the overall score and on the three verbal subscales. Apparent interactions persisted with Russian students showing significantly wider variation between the at-risk and control groups than did the American students.

Table 4.

		Diagnostic Measures & Pretests			Posttest Measures		
		Overall Mean	At-risk Mean	Control Mean	Overall Mean	At-risk Mean	Control Mean
DITA (Teacher)	American	1.40	1.68	1.12			
	Russian	1.80	2.22	1.44			
		A>R	A>R	A>R			
DIDT (Test)	American	1.68	1.88	1.49			
	Russian	2.09	2.60	1.66			
		A>R	A>R	A>R			
DITotal	American	1.54	1.78	1.31			
	Russian	1.96	2.43	1.56			
		A>R	A>R	A>R			
Language	American	2.14	2.25	2.03	1.62	1.69	1.55
	Russian	2.57	3.00	2.20	1.54	1.81	1.32
		A>R	A>R	A>R	R>A	A>R	R>A
Mathematics	American	1.58	1.65	1.52	1.23	1.28	1.19
	Russian	2.35	2.62	2.13	1.43	1.61	1.27
		A>R	A>R	A>R	A>R	A>R	A>R
Reading	American	2.19	2.28	2.10	1.70	1.75	1.65
	Russian	2.43	2.93	2.00	1.54	1.79	1.33
		A>R	A>R	A>R	R>A	A>R	R>A
Writing	American	2.01	2.13	1.89	1.42	1.53	1.32
	Russian	3.04	3.42	2.87	1.54	1.83	1.31
		A>R	A>R	A>R	A>R	A>R	R>A
Total Test	American	1.80	1.88	1.73	1.41	1.47	1.36
	Russian	2.43	2.80	2.13	1.48	1.69	1.30
		A>R	A>R	A>R	A>R	A>R	R>A

Question 4 addressed the issue of gender effects in learning. Data were organized into a 2 X 2 contingency table with at-risk/control and gender as row and column variables. A Chi-square test of independence was carried out and the Phi measure of association was calculated. Results of the analysis suggested, for both the American and Russian groups, that gender was associated with being diagnosed as at-risk. These results (See Table 5) were statistically significant although the association was low (.13 to .16).

Table 5.

Chi-square analyses (Gender by group membership) by nation:

American students

	Male	Female	Row Total
at-risk	115	80	195
			49.1
control	87	115	202
			50.9
Column Total	202	195	397
	50.9	49.1	100.0

T	DF	p	ϕ/Φ
10.04294	1	.00153	0.15905

Russian students

	Male	Female	Row Total
at-risk	80	75	155
			45.3
control	73	114	187
			54.7
Column Total	153	189	342
	44.7	55.3	100.0

T	DF	p	ϕ/Φ
5.42119	1	.01989	0.12590

Discussion

Results of the analyses carried out to answer Question 1 suggest that although group analyses of data reveal significant differences the application of these scores in sorting individuals into dichotomous groups may be limited. Not surprisingly, American students were less effectively sorted using the Russian diagnostic screen than were the Russian students. An important limitation of the hit/miss analysis however is that the selection of a dichotomous break-point (in this case, the mean) can have significant consequences for hit/miss outcomes. The selection of another break point (e.g. -0.5) could therefore result in a substantially altered outcome.

Results of correlation analyses confirmed the discriminative power of the Russian screen and also highlighted the enhanced discriminative power of the instrument when used by Russian teachers with Russian students. Despite training provided to the American educators, Russian educators managed to account for nearly five times the variance on the posttest scores. Apparently, familiarity with the instrument seems to play an important role in this kind of informal assessment.

Perhaps most interesting among the results obtained in attempting to answer questions 2 and 3 were the findings that Russian control students seemed to overtake their American counterparts on the posttest measure but that this was not true of the Russian at-risk group. Apparently, although the control students closed the gap with their American counterparts, the at-risk students did not.

Finally, concerning the issue of gender effects on the diagnosis of learning difficulties, it appears that although Russian boys are not quite as likely to be diagnosed as at-risk as are American boys a significant gender effect seems to persist across both national groups.

Appendix A

Diagnostic Screen

Diagnostic Teacher Report (DITA)

Overall energy and appearance of health
Attitudes toward authority and the teacher
Attitudes toward classmates
Overall level of motivation and curiosity
Breadth of prior knowledge about the world
Overall language development

Diagnostic Test (DIDT)

Recognizing and copying of a two-color graphic pattern
Drawing of a graphic pattern (beads on a string) from verbal instructions
Visual problem solving (create 6 permutations of three-symbol strings)
(e.g. {a,b,c} => {a,b,c},{c,b,a},{b,a,c},{b,c,a},{c,a,b},{a,c,b})
Visual matching of geometric forms (with rotation)
Phonemic segmentation
a) from an aural prompt
b) from a visual (picture) prompt

Achievement measure

Mathematics

Computation (Addition & Subtraction)
3 one-digit terms (3+4=7, 9-3=6)
1 two-digit term and 2 1-digit terms (7+5=12, 16-7=9)
2 two-digit terms and 1 one-digit term (18-4=14, 23+46=69)
Number concepts:
Drawing objects to correspond to a specified number groups. Draw the different ways 6 balloons can be colored using red and green crayons.
Interpreting arithmetic word problems:
Verbal prompt: Four cookies were on a plate. One cookie was eaten. How many cookies are on the plate?
Task: Rewrite and answer problem numerically (4-1=3)

Language (Language score is a composite of reading and writing)

Writing
Copying of a sentence
Writing from dictation

Reading
Oral reading accuracy
Reading comprehension
Listening comprehension
Picture interpretation
Sentence rearrangement (arrange words to form a sentence)

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